We claim:

1. A survey instrument comprising:

(a) a moderator; and

(b) an array of gamma ray detectors disposed within the moderator; wherein

(c) responses of the gamma ray detectors to a source of radiation are combined to yield an indication of position of the source relative to a reference.

2. The instrument of claim 1, further comprising a neutron detector, wherein dimensions of the moderator and material of the moderator and position of the neutron detector within the moderator are selected so that the neutron detector is substantially equally responsive to fast and thermal neutrons.

3. The instrument of claim 2 further comprising a processor wherein the responses from the gamma ray detectors are combined to determine:

(a) intensity of gamma radiation impinging upon the survey instrument from the source; and

(b) an indication of azimuthal direction of the source with respect to the reference; wherein

(c) the reference is located on the instrument.

4. The instrument of claim 3 wherein the intensity of gamma radiation comprises a sum of the responses from the gamma ray detectors.

5. The instrument of claim 3 wherein the indication of azimuthal direction of the source comprises a ratio of responses of pairs of the gamma ray detectors.

6. The instrument of claim 3 further comprising a display on which the neutron response, the intensity of gamma radiation, and the indication of azimuthal direction are displayed.

7. A survey instrument comprising:

(a) a moderator;

(b) a neutron detector, wherein:

(i) the moderator is substantially rectangular, and

(ii) dimensions of the moderator and material of the moderator and position of the neutron detector within the moderator are selected so that the neutron detector is substantially equally responsive to fast and thermal neutrons;

(c) four gamma ray detectors wherein

(i) each gamma ray detector comprises a scintillator and a light collecting device optically coupled to the scintillator, and

(ii) the gamma ray detectors are disposed within the moderator symmetrically around the neutron detector and with each at a corner of the moderator; and

(d) a processor in which gamma ray responses from the gamma ray detectors are combined to yield

(i) intensity of gamma radiation impinging upon the survey instrument from a source, and

(ii) an indication of azimuthal direction of the source with respect to a reference on the survey instrument.

8. The instrument of claim 7 wherein:

(a) the indication of azimuthal direction comprises a ratio of responses of pairs of the gamma ray detectors; and

(b) intensity of gamma radiation comprises a sum of the responses of the gamma ray detectors

9. The instrument of claim 8, wherein:

(a) major axes of the gamma ray detectors are parallel to the major axes of the neutron detector; and

(b) the ratio and the sum are used to determine the azimuthal direction.

10. The instrument of claim 8, wherein:

(a) major axes of the gamma ray detectors are perpendicular to the major axes of the neutron detector; and

(b) the ratio is used to determine the azimuthal direction.

11. The instrument of claim 8 further comprising a display on which the neutron response, the intensity of gamma radiation, and the ratio are displayed.

12. The instrument of claim 7 wherein the neutron detector comprises a helium-3 detector.

13. The instrument of claim 7 wherein the scintillator comprises cesium iodide and the light collecting device is a photodiode.

14. The instrument of claim 7 wherein the moderator comprises polyethylene.

15. The instrument of claim 7 wherein the instrument is hand held.

16. A method for measuring radiation from a source using a survey instrument, the method comprising the steps of:

(a) providing a moderator;

(b) disposing an array of gamma ray detectors within the moderator; and

(c) combining responses of the gamma ray detectors to yield an indication of position of the source relative to a reference.

17. The method of claim 16 comprising the additional steps of:

(a) providing a neutron detector; and

(b) dimensioning the moderator and positioning the neutron detector within the moderator and selecting moderator material so that the neutron detector is substantially equally responsive to fast and thermal neutrons.

18. The method of claim 17 comprising the additional step of combining the responses from the gamma ray detectors to determine:

(a) intensity of gamma radiation impinging upon the survey instrument from the source; and

(b) an indication of azimuthal direction of the source with respect to a reference, wherein the reference is located on the survey instrument.

19. The method of claim 18 comprising the additional step of summing the responses from the gamma ray detectors to determine the intensity of gamma radiation.

20. The method of claim 18 comprising the additional step of forming a ratio of responses of pairs of the gamma ray detectors to determine the indication of azimuthal direction.

21. The method of claim 18 comprising the additional step of displaying the neutron response and the intensity of gamma radiation and the indication of azimuthal direction.

22. A method for measuring radiation with a survey instrument, the method comprising the steps of:

(a) providing a moderator that is essentially rectangular;

(b) providing a neutron detector;

(c) dimensioning the moderator and selecting material of the moderator and positioning the neutron detector within the moderator so that the neutron detector is substantially equally responsive to fast and thermal neutrons;

(d) providing four gamma ray detectors wherein each the gamma ray detector comprises a scintillator and a light collecting device optically coupled to the scintillator;

(e) disposing the gamma ray detectors within the moderator symmetrically around the neutron detector and with each at a corner of the moderator; and

(f) combining gamma ray responses from the gamma ray detectors to yield

(i) intensity of gamma radiation impinging upon the survey instrument from a source, and

(ii) an indication of azimuthal direction of the source with respect to a reference on the survey instrument.

23. The method of claim 22 comprising the additional steps of:

(a) forming a ratio of responses of pairs of the gamma ray detectors to obtain the indication of azimuthal direction; and

(b) summing responses of the gamma ray detectors to obtain the intensity of gamma radiation.

24. The method of claim 23 comprising the additional steps of:

(a) aligning major axes of the gamma ray detectors so that they are parallel to the major axes of the neutron detector; and

(b) using the ratio and the intensity of gamma radiation to determine the azimuthal direction.

25. The method of claim 24 comprising the additional steps of:

(a) orienting the survey instrument in a first position so that the ratio is unity;

(b) observing a first gamma radiation intensity with the survey instrument in the first position;

(c) rotation the survey instrument 180 degrees to a second position so that the ratio is again unity;

(d) observing a second gamma radiation intensity with the survey instrument in the second position; and

(e) using the first and the second gamma radiation intensities to uniquely determine the azimuthal direction of the source relative to a reference surface of the survey instrument in the first position.

26. The method of claim 23 comprising the additional steps of:

(a) aligning major axes of the gamma ray detectors so that they are perpendicular to the major axes of the neutron detector; and

(b) using the ratio to determine the azimuthal direction.

27. The method of claim 26 comprising the additional steps of:

(a) orienting the survey instrument in a position so that the ratio is unity; and

(e) uniquely determining the azimuthal direction of the source relative to a reference surface of the survey instrument.